Plimmer Test
Operation and Maintenance User Manual

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Operation and maintenance manual

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1 General

The purpose of this manual is to provide the necessary information for the installation, use and maintenance of the Plimmer.

i the user should read this manual before using the Plimmer.

Improper use could damage the Plimmer and will result in your warranty becoming void.
When asking our sales and after-sales services for technical information or spare parts, please indicate the model identification and construction numbers found on the nameplate.
The following instructions and warnings refer to the standard model; for any variations or characteristics of the special versions please refer to the sales contract.
For any instructions or situations not referred to in this manual or in the sales documentation, please contact our sales service.

1.1 Preliminary inspection

1.1.1 VISUAL CHECK

Upon delivery check the integrity of the packaging.
After unpacking the Plimmer make sure that no damage has occurred during shipping.
Should the Plimmer be damaged, please inform our agent within 8 days from the delivery date.

1.1.2 MATERIALS HANDLING AND STORAGE

The product must be handled with care; impacts can cause damage without any visible external signs.

1.2 Warranty

STANDARD WARRANTY TERMS AND CONDITIONS

1.GENERAL TERMS AND CONDITIONS

1.1. Plimmer has been manufactured to the highest quality standards and is warranted to the original purchaser recipient only. This warranty is not transferable.

1.2. The product is guaranteed to be free from defects in workmanship and parts for a period of 12 months from the date of purchase. Defects that occur within this warranty period, under normal use and care will be repaired or replaced at our discretion, solely at our option with no charge for parts or labour.

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1.3. IDROPAN DELL'ORTO DEPURATORI SRL reserves the right to replace the Product or relevant part with the same or equivalent product or part, rather than repair it. Where a replacement is provided the Product or part replaced becomes the property of IDROPAN DELL'ORTO DEPURATORI SRL. IDROPAN DELL'ORTO DEPURATORI SRL may replace parts with refurbished parts. Replacement of the Product or a part does not extend or restart the Warranty period.

1.4. The benefits conferred by this warranty are in addition to all rights and remedies in respect of the product that the consumer has under the Trade Practices Act and similar state and territory laws.

1.5. The Warranty is transferable to a new owner, in the event of sale of the Product, provided the new owner has the receipt of purchase and the Product is still within the guaranteed period.

2.PROOF OF PURCHASE

2.1. Please keep your purchase docket or receipt as proof of purchase and as proof of the date on which the purchase was made. The purchase docket or receipt must be presented when making a claim under this warranty. If in the event the receipt of purchase is not presented, then this warranty is invalid.

3.SERVICE OR REPLACEMENT DURING THE WARRANTY PERIOD

3.1. In the event that Plimmer is Dead On Arrival (DOA), the owner has 14 days in which to return the Product to the retailer or place of purchase for a new replacement. If the owner does not return the product within 14 days then the Product will be treated under normal warranty conditions.

3.2. Under normal warranty conditions the product must be returned to the Retailer, place of purchase, or any IDROPAN DELL'ORTO DEPURATORI SRL Service Centre in the country of purchase.

3.3. Please ensure that the product is properly packaged so as to ensure that no damage occurs to the product during transit. Also make sure you have included an explanation of the problem.

3.4. In the event that the goods requiring repair under warranty, the owner is responsible for the cost of transportation to and from the service centre. Whilst in transit the goods are at the owners risk.

3.5. Should the goods be found in sound working order the owner may be charged a fee.

4.GENERAL EXCLUSIONS AND LIMITATIONS

4.1. In the event that no identical Product is available for service repair, IDROPAN DELL'ORTO DEPURATORI SRL has the right to replace the Product with a device of equal capacity, or offer the customer the choice of a Product upgrade which may incur an extra cost.

4.2. This warranty is limited to defects in workmanship or parts. All defective products or parts will be repaired or replaced. This warranty does not extend to accessories. This warranty does not cover manuals and packaging, line cords or wiring.

4.3. This warranty does not cover consumable items.

4.4. This warranty does not cover any defect caused by an accident, misuse, abuse, improper installation or operation, lack of reasonable care, unauthorised modification, loss of parts,

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tampering or attempted repair by a person not authorised by the distributor.

4.5 The warranty will not apply if the factory-applied serial number has been altered or removed from the Product.

4.6. The warranty will not apply if damage, malfunction or failure resulting from alterations, accident, misuse, abuse, fire, liquid spillage, maladjustments of customer controls, use on an incorrect voltage, power surges and dips, thunderstorm activity, acts of God, voltage supply problems, tampering or unauthorised repairs by any persons, use of defective or incompatible accessories, exposure to abnormally corrosive conditions or entry by any insect, vermin or foreign object in the Product.

4.7. This warranty does not cover damage arising during transportation, installation or while moving the Product, or to any transportation costs of the Product or any parts thereof to and from the owner, unless otherwise specified in these warranty conditions.

4.8. This warranty does not apply whilst outside the country of purchase.

4.9. IDROPAN DELL'ORTO DEPURATORI SRL will not be liable for any loss, damage or alterations to third party furniture, hardware or software; or programs, data or information stored on any media or any part of the Product, no matter how occurring; or for any loss or damage arising from loss of use, loss of profits or revenue, or for any resulting indirect or consequential loss or damage.

4.10. IDROPAN DELL'ORTO DEPURATORI SRL's aggregate liability in respect of all claims under the Warranty shall not exceed the original purchase price of the Product or, at IDROPAN DELL'ORTO DEPURATORI SRL's option, the cost of replacing the Product.

4.11. This warranty does not cover normal wear and tear of the Product or parts.

4.12. IDROPAN DELL'ORTO DEPURATORI SRL excludes all other warranties, conditions, terms, representations and undertakings, whether express or implied.

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1.3 Applications

This technology has the potential to be applied in numerous applications.

We have three ranges of the Plimmer:

1. Plimmer Apha – For Partial desalination
2. Plimmer Delta – For Full Demineralization
3. Plimmer Gamma – For Special applications and treatment of wastewater

Below are more details of three type of Plimmer

Plimmer α

- When only partial desalination is required
- To substitute an ion exchange softener without the need for using salt
- For irrigation
- To remove Nitrates, Arsenic and organics contaminants from drinking water

Plimmer δ

- Wherever demineralisation of water is needed
- To obtain residual conductivity of less than 4 µS/cm, a double pass version can be used
- A multiple pass version exists to demineralise water with high salt concentration (up to 10.000 mg/l of NaCl)

Plimmer γ

- For the reuse of municipal and industrial wastewater
- To reduce the salt concentration after chemical precipitation plants
- To desalinate water after biological treatment plants in relation to their re-use and possibly avoiding the use of membranes
- To reduce investment and operational costs of a thermal distiller or of Reverse Osmosis plants. Also to reduce the load on seawater desalination systems.
- And for all other special applications

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2. Important safety information

The user should read this manual before using the Plimmer.

Improper use could damage the Plimmer and will result in your warranty becoming void.

The following instructions and warnings refer to the standard model; for any variations or characteristics of the special versions please refer to the sales contract.

For any instructions or situations not referred to in this manual or in the sales documentation, please contact our sales service.

Addtionally please observe security and industrial safety regulations.

2.1. Protection against freezing

Plimmer is a machine that treats and contains water. For this reason install and store the Plimmer in places where temperatures do not allow water to freeze.

If this happens, **The Plimmer will be damaged**

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3. Technical Data

Plimmer is an entirely modular system that with the following basic components:

- 2 Plimmer cells
- 1 Power supply
- 1 Electrovalve set
- 1 Electronic interface control system

	Plimmer 2 cells	Plimmer 4 cells	Plimmer 6 cells	Plimmer 8 cells
WATER TREATED (l/h)	**300**	**600**	**900**	**1200**
DAILY QUANITY m^3/day	**7.2**	**14.4**	**21.6**	**28.8**
MAXIMUM SALINITY ppm NaCl	**1000***	**1000***	**1000***	**1000***
RECOVERY %	**80**	**80**	**80**	**80**
POWER USAGE W	**250**	**500**	**750**	**1000**
POWER TYPE	**SINGLE PHASE**	**SINGLE PHASE**	**SINGLE/TRIPLE PHASE**	**SINGLE/TRIPLE PHASE**
INSTALLATION POSSIBILITIES	**WALL/FLOOR**	**WALL/FLOOR**	**FLOOR**	**RACK**
LENGTH mm.	**600**	**600**	**1000**	**1000**
WIDTH mm.	**480**	**480**	**480**	**480**
HEIGHT mm.	**320**	**320**	**320**	**320**

The above configurations can be optimized in order to process larger volumes of water:

- Rack standard dimensions (6 units maximum)
  600mm. X 1250mm. X h. 2200mm.
- Small rack drawer (3 drawers maximum)
  600 mm. X 1250mm. X h 1200 mm.

Idropan dell'Orto reserves itself the right to change technical and aesthetical characteristics of all machines.

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Plimmer is an entirely modular and customisable system with the following basic components:

- 2 Plimmer cells
- 1 Power pack
- 1 Electrovalve set
- 1 Electronic interface control system

	Plimmer 2 CELLS	Plimmer 4 CELLS	Plimmer 6 CELLS	Plimmer 8 CELLS
WATER TREATED (l/h)	**200**	**400**	**600**	**800**
DAILY QUANITY m^3/day	**4.8**	**9.6**	**14.4**	**19.2**
MAXIMUM SALINITY ppm NaCl	**1000***	**1000***	**1000***	**1000***
RECOVERY %	**80**	**80**	**80**	**80**
POWER USAGE W	**250**	**500**	**750**	**1000**
POWER TYPE	**SINGLE PHASE**	**SINGLE PHASE**	**SINGLE/TRIPLE PHASE**	**SINGLE/TRIPLE PHASE**
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LENGTH mm.	**600**	**600**	**1000**	**1000**
WIDTH mm.	**480**	**480**	**480**	**480**
HEIGHT mm.	**320**	**320**	**320**	**320**

- Rack standard dimensions (6 units maximum)
  600mm. X 1250mm. X h. 2200mm.
- Smaller rack dimensions
  600 mm. X 1250mm. X h 1200 mm.

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4. How it works

The Plimmer is an innovative system used to desalinate water without using resin or membrane filters.

It does not require chemical products to operate it.

Uses only a direct current at low voltages (1.5V) to create the separation electric field.

The Plimmer technology requires the lowest power consumption at equal quantities of separated salts.

Does not require the pretreatment of water – only a reusable/washable pre-filter for larger than 25 micron particles.

Does not use electrolysis as the main working principle – electrolysis requires higher voltages.

This technology in the world able to remove all ions from raw water.

The most important are :

Temporary Hardness	$Ca(HCO_3)_2$ $Mg(HCO_3)_2$
Total Hardness	$CaCl_2$ $MgCl_2$ $CaSo_4$ $MgSO_4$
Sodium chloride	NaCl
Sodium sulphate	Na_2SO_4
Nitrate	Anion NO3
Nitrite	Anion NO_2
Ammonia	NH_4+
Iron (Fe)	(when present in ionic form)
Magnesium (Mm)	(when present in ionic form)
High level of oxidizers	(when connected with humic acid)
Organic Micro pollutant	(when present in dissociated form)
Hexavalent chrome	
Arsenic	
Heavy Metals	

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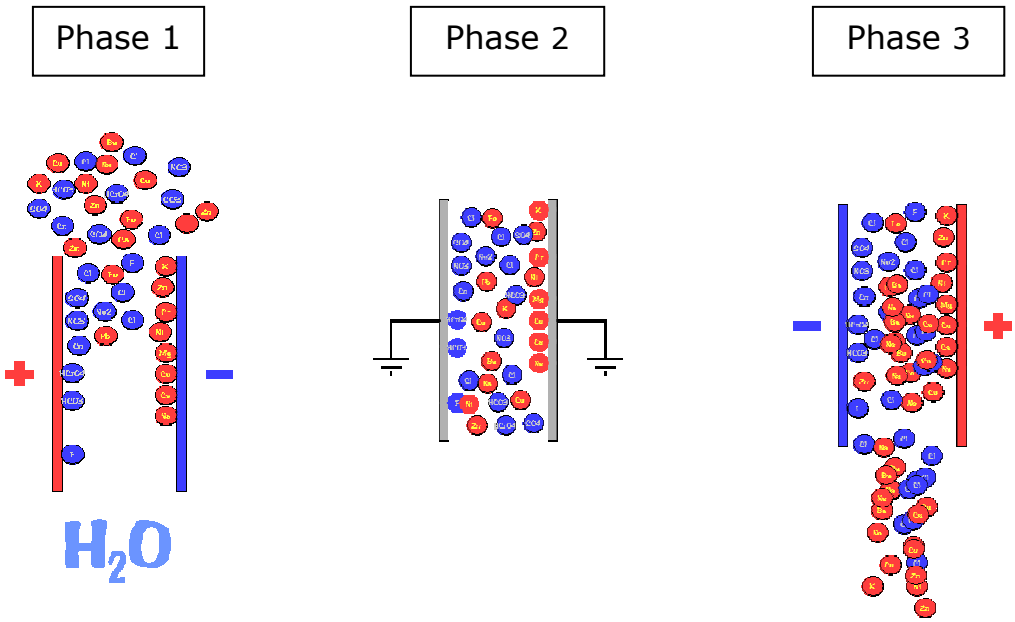
During the cleaning phase, the ions present in the water are attracted and kept in the electrode that is fed with opposite polarity

After having removed a certain quantity of ions, they begin to escape in the exit

This is what is referred to as “The Plimmer being loaded”.

The working flux is interrupted and the electrical supply to the electrodes is cut through a short circuit. The ions which were absorbed on the electrodes recombine after detaching from the electrodes.

The electrodes are then supplied with an opposite charge for a short period of time (10-30 seconds). A reduced flow of water flushes the concentrated salts in the cell for either disposal or re use. Then the cycle starts again.



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5. Assembling

Accessories may defer according to local regulation.

Please make sure that you follow these correctly!

5.1 Electricity supply

Check local regulations before choosing the most appropriate type of installation.

If you are not sure, please contact us for advice.

Plimmer demand an electricity supply that according with the different models could be:
220V monophase + Earthing
(3 x 380V + Neutral + Earthing only for Rack models)

TABLE OF ELECTRICAL CONSUMES

Plimmer Cells	220 (Average/Snap)	380	Magnetotherm Protection	Differential
2	150/300 W		6A	30 mA
4	300/800 W		10A	30 mA
6	450/1100W		10A	30 mA
8	600/1600 W		16A	30 mA
Rack	Check on the rack			30 mA

On the left you can see the average consumption as well as the peak (max duration 2 or 3 seconds)

The Plimmer requires protection with a magneto-thermic/differential switch (circuit breaker) as in the table above.
The protection with a differential switch improves safety
This must always be used

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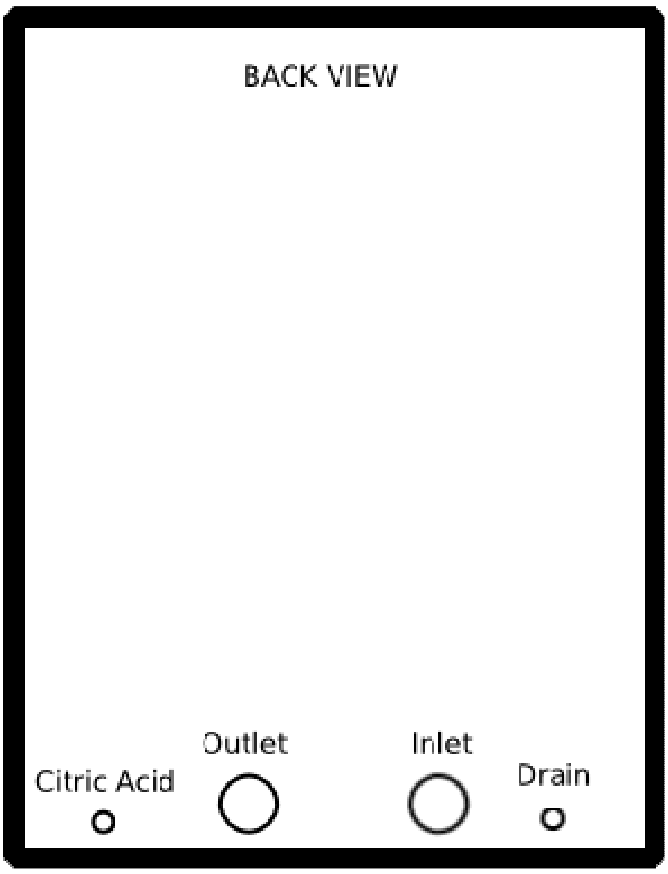
5.2 Plimmer plumbing connections



Remember to add filter and pressure reducer on the inlet line

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6. Start-up
6.1 Initial Start – up

Warning Please verify before that a pressure reducer is installed before conntecing the Plimmer and that funtional pressure is less than 1.5 bars.

Idropan Dell'Orto depuratori srl is does not accept responsibility in case of damage due to higher pressure.

Verify that all the links correspond to those illustrated earlier in the manual.

It is fundamental to check that the part of the tube that connect A to 1A is completely clean. We advise to let water pass freely for a few minutes before connecting those points.
Warning – Plimmer might be subject to water hammer, due to the air in the tubes, during the first working minutes. We advise to reduce the operating pressure for the first 10 minutes.

Verify that all pipes are well connected and that there are no leaks.

Connect the Plimmer to the mains; the following text will appear on the screen:

Plimmer Test

The text will disappear after three seconds, and the operative conditions will be displayed.

Either of these options may appear in the first line :

1. Plimmer Off
2. Plimmer Starting
3. Plimmer On
4. Plimmer Shutting Off

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Attention!

When the Plimmer is switched on for the first time it should be in production BEFORE the water taps are opened.

When the Plimmer is ready to produce, partially open the entry valve in order to verify the presence of any leaks.

Let the machine work at a reduced flux level for at least 10 minutes, and then gradually bring values to idle operating levels.

6.2 Operation

To switch on the unit, press the button. The system may ask a password (the default is 1000). Once the password is accepted, press again the power button.
The message on the display will be "Plimmer starting" and after about 2 minutes, the unit will begin operation and show on the display "Plimmer On".

To switch off the unit, press again the same button, unit will ask password and the start the shutting off cycle. When the procedure is endend, the screen will display "Plimmer Off".
Unit can now be unplugged from electrical outlet.

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i it is advisable to drain the water produced in the first 30-60 minutes.

i According to the uses of the Plimmer, it is advisable to disinfect the output tank.

Plimmer uses a proactive maintenance solution injected at intervals in the unit.
For this reason is necessary to insert the suction filter in the maintenance solution tank.
At the beginning the suction pipe is empty and for this reason is advisable to perform a cleaning procedure during Plimmer start up.
Please refer to this manual for maintenance cleaning procedure.

6.3 Plimmer initial calibration

According to the customers preference, it is necessary to adjust values in order to change the

- Working flow
- Waste water volume during regeneration

The water flow influences greatly the output water quality.
Plimmer is a "linear" machine.

This means there is a linear relationship between the main operating values of working result and:

- Input salinity (TDS and conductivity)
- Flow
- Output salinity (therefore input-output salinity ratio)

As the input salinity grows, the output salinity grows.
As the flow grows, the output salinity increases.
And viceversa;

As input salinity decreases, output salinity decreases.
This means that as the flow decreases, the output quality increases.
As the flow decreases, the output salinity decreases.
This is true for the voltage to cells. An increase in voltage increases the output water quality.
An accurate adjustment is therefore necessary to satisfy the customer's needs.

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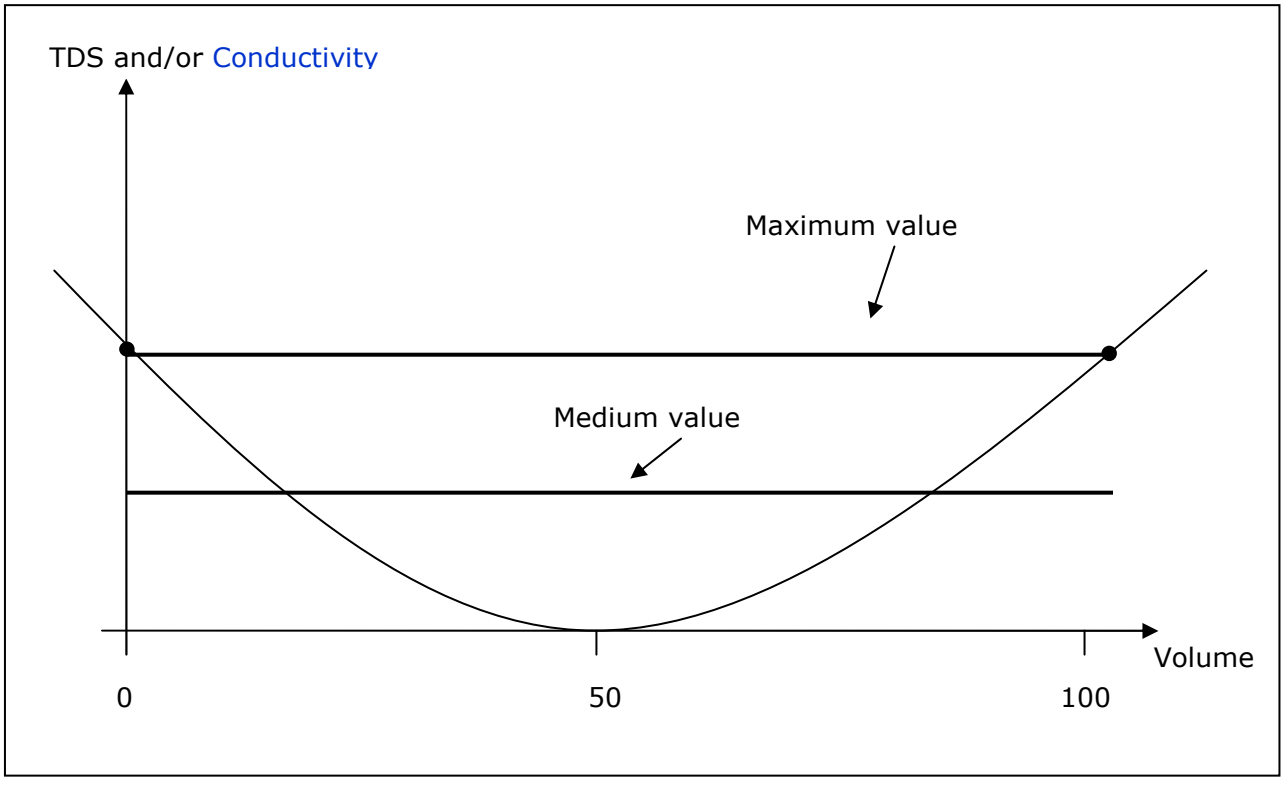
The adjustment occurs in two phases:

- First phase –
    1. Open all the three valves completely
    2. Adjust pressure adapter installed before Plimmer
    3. Wait at least ten minutes and verify all water values: TDS, Conductivity and any other relevant data.

- Second phase –
    1. Verify that volume values of Plimmerized water are kept at:
        a. Plimmer Delta: 200 l/h
        b. Plimmer Alpha: 300 l/h
    2. Verify that all values are kept at satisfying level.

Some Plimmer models read the volume water discharged during regeneration and so the second phase of calibration is not required.

During normal operation of the Plimmer, you will have a fluctuation in water quality as in the diagram below during the operating cycle of a cell.



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Important

Although within a Plimmer there are flow stabilizers, input water must be constant. Water quality changes with pressure or discharge volume. Depending on the particular type of Plimmer model, they will be equipped with different types of sensors, according to the different needs. The value adjustment procedure explained previously can be adjusted in different modes:

In the models with flux and flow sensors, the values can be read by pressing the button below.

To access this mode, the "Magnifying glass button" is required to be pressed.

- In the models with hydraulic flux meter, the values will be measured by calculating the volume of water passed in a given amount of time. (the phase time)

- For models that do not contain sensors, the values can be read and calculated manually from the output water.

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6.4 Plimmer operating phases

Plimmer has 8 operating phases:

PHASE	CELL 1	CELL 2
1	Ion separation	Production
2	Rinse 1	Production
3	Rinse 2	Production
4	Pre – Production	Production
5	Production	Ion separation
6	Production	Rinse 1
7	Production	Rinse 2
8	Production	Pre – Production

i Some Plimmer could have different cycles.

6.5 Volume reading and calculation of recovery percentage

Within the Plimmer, the electronic flux readers will reset at the start of the first phase for cell 1 and at the start of the fifth phase for cell 2. This will make it very easy to calculate the recovery percentage. The values that will have to be read are: the volume at the beginning of the fifth phase for cell one (the amount of water necessary for the recovery) and the volume at the end of phase 8 (total flux volume passed in the cell)

$$\text{Recovery percentage \%} = 100 * \left(1 - \frac{\text{Phase 5 Initial Volume}}{\text{Phase 8 Final Volume}}\right)$$

For the second cell, the phases to consider are at the beginning of phase one and the end of phase four.

Attention! If the drain flow is not adjusted efficiently, some calcium and magnesium might precipitate on the cells. If this is the case, the Plimmer must be washed with citric acid as described in the maintenance section.

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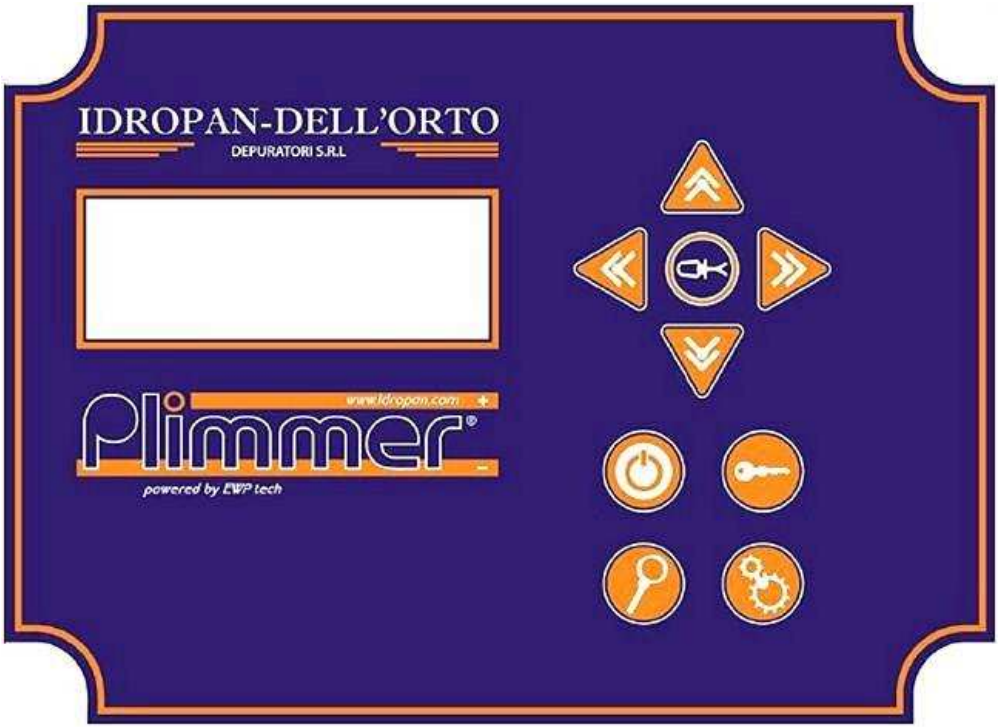
7. Front view display



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8. General menu description

8.1 Buttons

The buttons on the control panel carry out the following functions:

The up and down arrows allow to increase or decrease a digit. They are necessary for any digit modification or any other response needed.

The left and right arrows give the chance to move on the digit that needs modifying. They are necessary for any response that has to be given to the machine.

The OK button confirms any operation.

The On/Off button indicates the status of the machine. If the LED is off, the machine is in standby mode and is waiting for any command.

This button works only after the password has been inserted. If the password was not requested before, by pressing it the Plimmer will request a password. Details on passwords are illustrated in the paragraph on the Key button.

To access the password request, the installer must push the key button together with the left and down arrows. The default password is 01000.

The user instead must push the Key button only, and the default password is 10000.

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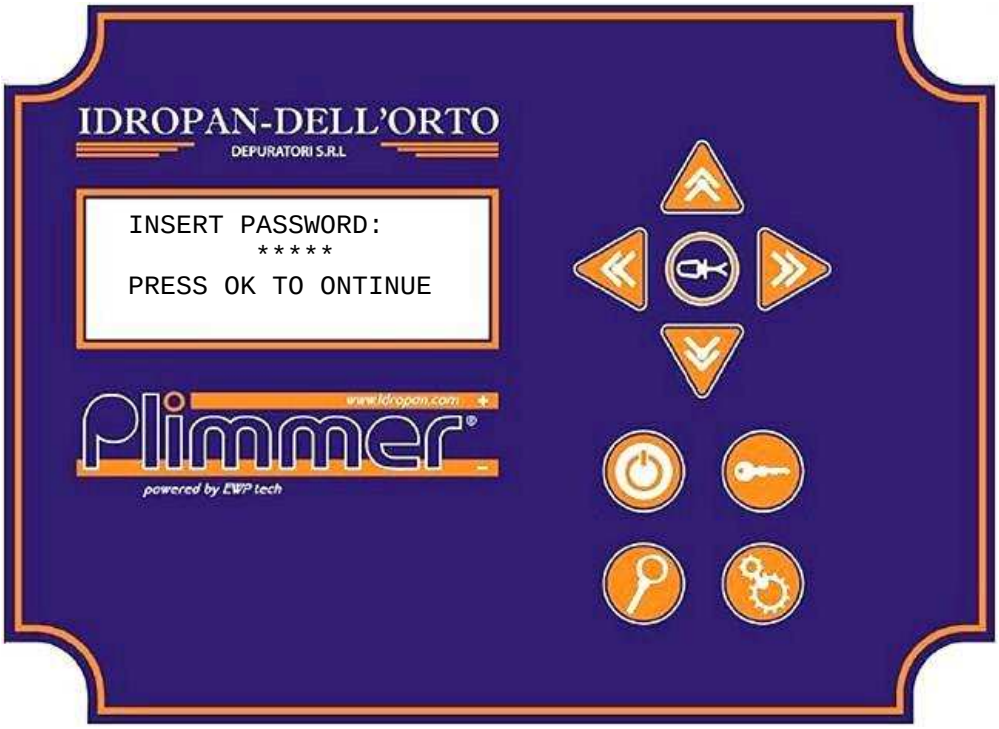
The following screen will be displayed:




```
INSERT PASSWORD:
      *****
PRESS OK TO CONTINUE
```

The password contains five digits, represented by the following symbol: *.

The user can use the left and right buttons to select the required digit, and the up and down buttons to choose the number or letter desired. When the password is correctly inserted, press OK to confirm

The password will remain active for about 20 seconds, after that time the password will have to be inserted a second time.

Pressing the Key button when the password is active gives the chance to the user to change the password.

The Magnifying button allows changing the type of display visualization, simple or complete. This operation does not need any password.

The type of visualization will be determined by the led:

- Led OFF: Simple mode
- Led ON: Complete mode

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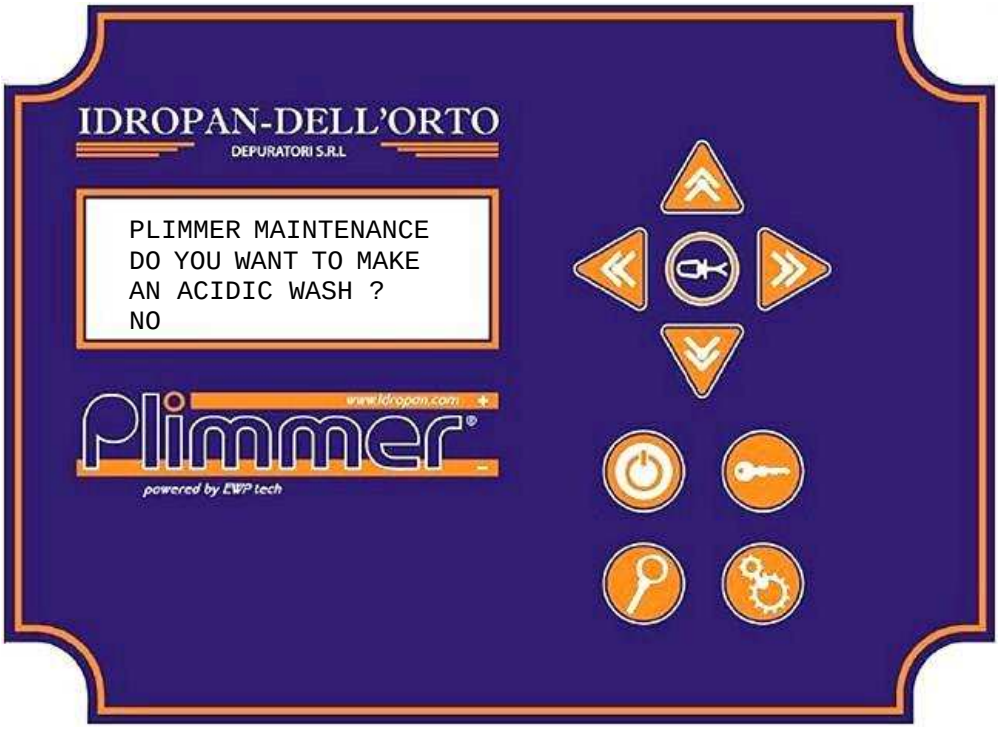
8.2 Setting menu (User)

The settings button gives the chance to modify some operative parameter and carry out a citric acid wash.

When the button is active the following message will appear:




```
PLIMMER MAINTENANCE
DO YOU WANT TO MAKE
AN ACIDIC WASH ?
NO
```

To initialize the cycle, use the left and right buttons and select Yes, then press OK to confirm. If instead you do not want to carry out the procedure, select NO and press OK to confirm.

If the citric acid wash has not been activated, the following screen will appear:

By pressing ok, you will see the following screen to select citric dosing time

```
CHOOSE CA DOSING
TIME
RANGE=15 TO 80
        30
```

The number represents the time in seconds of the citric acid injection. Each seconds means 1 cc.

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9.1 Maintenance

Plimmer is a machine that does not need large amounts of maintenance.

Please make sure on a regular basis, you perform a cell cleaning process.

However it is possible, due to inappropriate discharge water value adjustments, that calcium carbonate precipitates on the cell electrodes.

The condition above is very easy to spot, the user will notice:

- The flow will reduce
- The quality of the water will reduce

In this case, the maintenance process with citric acid is necessary.

Citric acid is an organic acid, present in everyday's lemon and orange juices, that today is obtained through different processes.

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9.2 Plimmer cleaning procedure

1. Activate the password request and insert password
2. Push the maintenance button

   Plimmer will ask you whether you want to carry out the maintenance process.

3. Using the arrows, select “Yes”. Confirm you decision with the “OK” button
4. The washing procedure will activate, citric acid will be pumped in the system in order to clean any incrustation, and will rinse automatically.

This process will repeat itself for three times.

After the last citric acid injection, one last prolonged washing will ensure that there are not residue bodies in the Plimmer.
Every phase will last 20 to 45 seconds and after it wait for 10 minutes, and the whole process will last 40 minutes.

i it is necessary to remember that along with the Plimmer, a 25µ filter must be installed in order to eliminate the biggest bodies. And therefore it is vital that it is kept clean.

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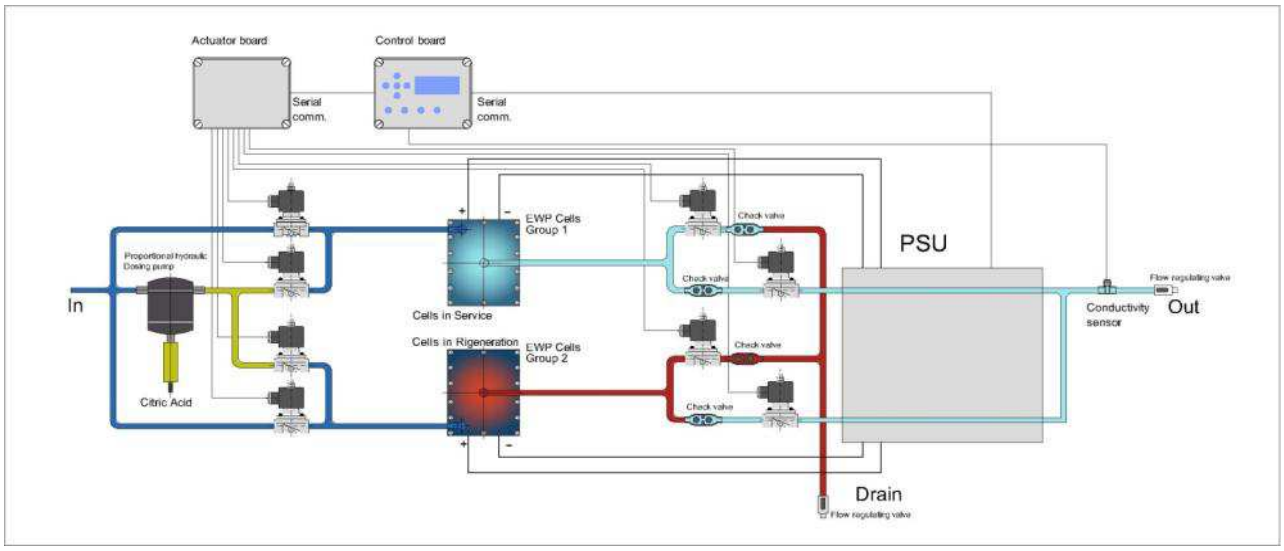
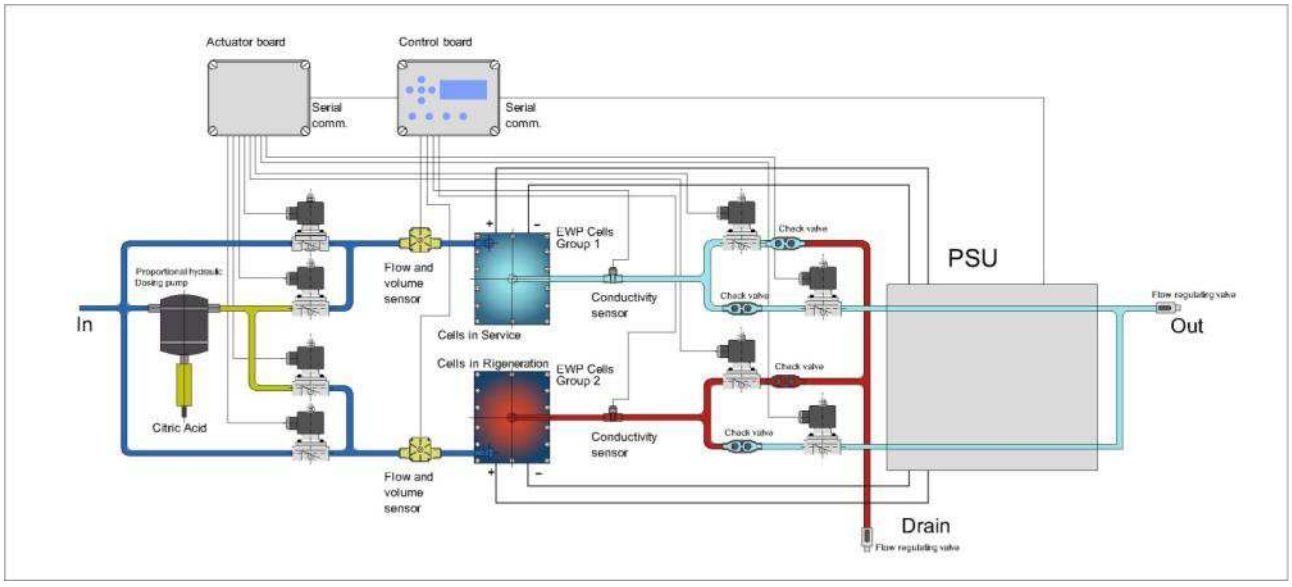
10. Tecnichal schematics

10.1 Operational schematics





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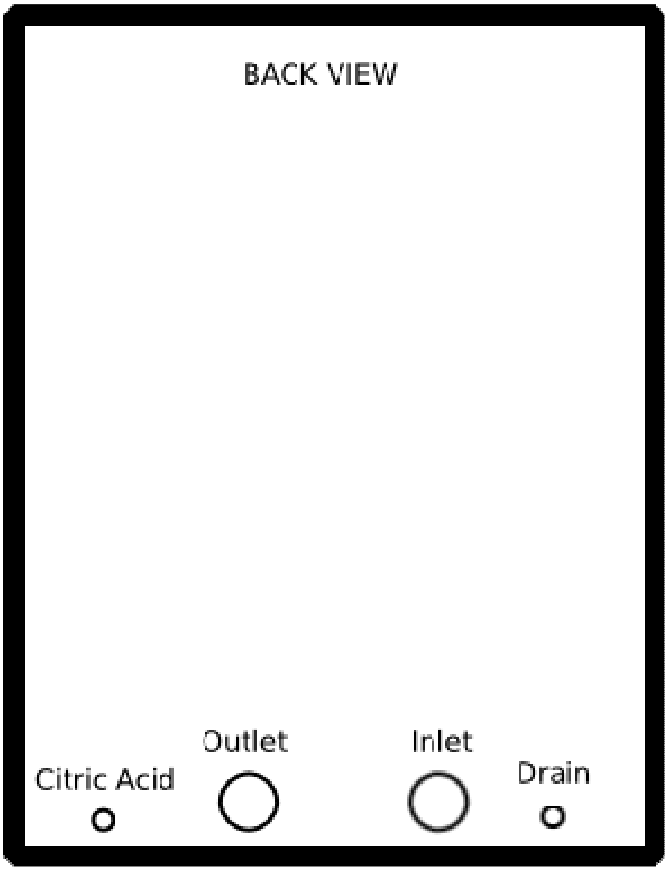
10.2 Plimmer plumbing connections



Remember to add filter and pressure reducer on the inlet line

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The necessary tubes are metric tube (Ø 15mm external, Ø 12mm internal; Ø 6mm external, Ø 4mm internal) made of Polyethylene, Polyurethane or Rilsan. If the output water will be used for drinking, the tubes must be approved by local regulations

Operating pressure

The Plimmer's maximum operative pressure is 1.5 Bars.
If there is a chance that the pressure reaches this value, a regulator must be placed in series in order to avoid any damage.

In the case the Plimmer were connected to a public water supply, a retaining valve can be installed. Verify the local regulations.

Plimmer must be supplied with 25uS filtered water.
The filter must therefore be installed. In some models of the Plimmer, the filter is included.

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